

Case Study No. 20 High-Solids Coatings and Waterborne Glue Saloom Furniture Winchendon, MA

Background

Saloom Furniture Company manufactures casual dining furniture and is based in Massachusetts. The company was started in 1982 by Peter Saloom and has evolved into a multi-million dollar company with more than 125 employees. The company expects to have more than \$13 million in sales in 1998.

Saloom's basic business philosophy is to design, finish, market, and distribute. Customers can choose their own colors, fabrics, and tile designs, and Saloom will deliver the finished furniture in 3 to 4 weeks to the customer. Dining tables with ceramic tile inserts in wood frames were one of Saloom's first products, and this product has continued to be their best seller. They have added chairs and bar stools in the last few years to complement the tables and round out their product lines. They also coat a small volume of case pieces, such as buffets and hutches.



Product sample

Saloom's manufacturing facility is located in Winchendon, MA, and is their only manufacturing facility. They consider themselves more of a finishing and final assembly operation type of furniture manufacturing facility. Of Saloom's 125 total employees, about 75 are directly associated with the manufacturing operations. Lloyd LeBlanc is the production manager and provided most of the information for this case study. The manufacturing facility works 1 shift, 5 days per week, with an occasional Saturday morning or extra hours on some days during their peak seasons. With their current production lines and floor space, they can increase the manufacturing staff by 40 percent before they would have to add a second shift. Saloom experienced 20 percent growth in 1998.

Winchendon is located in an area designated as attainment for ozone and the air quality monitors in the area show that the region attains the ozone standard. However, Massachusetts is within the political boundaries of the Ozone Transport Region.

Manufacturing and Coating Operations

Saloom receives most of their furniture components premilled and ready for final assembly and finishing. Most of the tables and chairs are made of solid maple or solid oak. The manufacturing area basically is divided into two lines. One line is used for assembling and finishing chairs and table base components. The second line is used to assemble and finish the wooden table tops or wooden frames. When Saloom added

chairs to complement their table product lines, the facility's chemical usage more than doubled because of the additional surface area to be coated.

Chairs and Table Base Finishing Area

At the time of the visit to Saloom's facility, the production line was coating 230 pieces per day. Each coating is applied in a separate spray booth with HVLP spray guns. Pieces that will receive a stain first are sanded, and then toner is applied. Eight colors of toner currently are used, each with a dedicated line and gun. The toner is not wiped, and the pieces are left to dry about 30 minutes before receiving the next coating. The next spray booth is used to apply stain or whitewash. The stains are hand wiped and the pieces are inspected. The products receive a sealer, which is sanded by hand, and then receive a topcoat.

Some pieces receive only a sealer and topcoat if a natural appearance is desired. If the piece is to receive a color coat instead of a stain, it is sanded and finished with two coats of either white, black, or green paint. After the final coat, the pieces are inspected and sent on a conveyor to the packaging area.

Table Finishing Area

The table tops enter the finishing area from the sanding area via a conveyor and are taken to the toner booth where they are sprayed (except for the tile-top table frames, which do not receive toner). Dry time is approximately 30 minutes. The next step is the stain booth, where the stain is hand wiped and allowed to dry for 30 minutes. The table tops then go to the sealer booth, receive a sealer, and are allowed to dry for 1 hour. They are lightly sanded and sent to the clean room for the topcoat application. The tables are allowed to dry and are inspected. Casgood components also are finished in this area.

Gluing Operations

Saloom produces 40 to 45 tables per day and approximately half of those have in-laid ceramic tiles. The tiles are glued to the table tops and then silicone grout is applied around the tile edges. The grout is applied in an area enclosed with plastic curtains to prevent any particles from migrating to the finishing area where they can cause "fisheye" defects in the topcoat. Tables are packaged and shipped unassembled.

The adhesive currently used by Saloom in their manufacturing operations is "Titebond™ Solvent-Free Construction Adhesive" supplied by Franklin International, Inc. As suggested by the name, the material has a very-low VOC content: 0.043 lb/gal VOC.

Saloom started manufacturing plastic laminate table tops in 1997. The contact cement used on some of the plastic components had a high VOC and HAP content, but no other glues that they tested performed as well. They wanted to continue reducing air emissions and the product line was not selling well, so they discontinued the product line instead of furthering their marketing efforts. Some of their other table tops are solid Corian® or granite tops and have no associated coatings or emissions.

Cleaning Operations

The finishing line operators change the sealer and topcoat booth filters daily and clean the spray booths thoroughly once per week with solvent (e.g., booth stripper or lacquer thinner). Cardboard also is used to cover the floor during cleaning operations. The spray gun tips are cleaned daily with lacquer thinner and the coating lines are flushed once per week. Having dedicated lines for each color coat eliminates the need for flushing the lines during color changes.

Facility Experience with Coating and Glue Alternatives

Saloom looks for products that have low impact on the environment. They started manufacturing and finishing solid-wood top tables five years ago and have evaluated several different types of finishes. Saloom tests all finishes for usability and durability. They have their own internal tests based on their experience with customers. Over the past few years, Saloom has tested several waterborne finishes, but none of them have been able to meet their performance standards. Issues they experienced with the waterborne coatings tested included: longer dry times; rough finish due to grain raise ; need for multiple coats to achieve the same finish resulting in higher material costs; and cloudy clearcoats. The dry times for the coatings tested were about four times as long as the coating they currently use. Because Saloom does not have the available floor space to handle that many additional in-process parts between spray booths, they will have to install some type of forced drying system if they begin using waterborne coatings.

Due to regulatory issues and a desire to keep their emissions under 50 tons per year, Saloom expects that they will be switching to some type of hybrid waterborne system in the next 2 to 4 years and will most likely install IR ovens to cure the coatings. They expect to convert to a waterborne topcoat first, and then eventually convert to a waterborne sealer and stain if they can find a high-quality product suited to their applications. They estimate that conversion to a waterborne topcoat will reduce their emissions by 20 percent.

Saloom also investigated high-solids, catalyzed coatings to replace solvent-borne nitrocellulose lacquers. One of the current nitrocellulose lacquers has a solids content of 35 percent by weight and a VOC content of 5.1 lb/gal. Saloom is using high-solids, catalyzed sealers and topcoats applied with HVLP spray guns. There are ten spray booths located in the facility and they usually are dedicated to a given type of coating applied to a specific product or group of products. However, because much of the coating operation involves physical moving of the parts into and out of the spray booth by the operator(s), there is a lot of flexibility as to how the booths can be used. Saloom is satisfied with the performance of the high-solids coatings.

Saloom invested in HVLP guns, but they feel that operator training is essential to achieving any savings in overspray. Initially, the operators wanted to apply the coatings the same way they did with airless equipment and turn up the pressure on the HVLP guns. To ensure operators were using the guns correctly, Saloom tried several types of process checks for the coating operations, such as (1) limiting the amount of

coating operators could use per product; (2) flow checks on the lines; and (3) in-house enforcement actions. LeBlanc commented that they had a hard time getting operators to use the equipment correctly.

Other alternatives Saloom investigated include electrostatic spray and flatline finishing with UV-curable coatings. They found that they cannot use electrostatic application equipment for coating solid wood materials, and flatline and/or UV-curing equipment is cost prohibitive for the number of tables they are producing.

Saloom switched to waterborne adhesives four years ago for gluing ceramic tiles to table tops. Prior to the switch, they were using a high-emitting solvent-borne glue that was 12 percent VOCs per gallon. With the waterborne glue there are virtually no VOC or HAP emissions. One of the results of switching to the waterborne adhesives was having to allow for a slightly longer dry time. However, the operators find this glue easier to use, because the solvent-borne glue dried so quickly they could not apply it to the whole table top at once. The total amount of adhesive used remained the same with the switch to waterborne glue. The silicone grout used between the ceramic tiles has no VOCs. LeBlanc indicated Saloom had to make sure there were no negative interactions between the grout and the waterborne adhesive.

Sherwin Williams and C.E. Bradley are used exclusively as coating suppliers and provide excellent service and support. LeBlanc said he has tried other coating suppliers, but did not experience the same level of customer service. Service is important to Saloom because of all the variables that can affect the final finish: wood, climate, application equipment, and application technique.

Costs

The Saloom representatives were not able to provide any cost information concerning the previous operational changes involving coatings and adhesives; however, they are anticipating the process change to the hybrid system to increase their operating costs by 5 to 10 percent.

Emissions

Saloom's VOC emissions in 1997 were 23.8 tons per year and they used approximately 10,000 gallons of coatings and solvents. Saloom's current permit allows 23 tons of VOC emissions per year, compared to a 12 ton per year limit in 1992. LeBlanc stated that Saloom has requested a higher VOC limit (49 tons per year) to accommodate the growth that they have experienced, and the expected growth in the next 5 years. The State permit authority is in the final stages of approving the higher limit. Saloom also is subject to the Wood Furniture NESHA.

Summary

Saloom has a good history of being proactive in their efforts to reduce and minimize VOC emissions, and is utilizing work practices, operator training programs, and housekeeping measures to minimize VOC and HAP emissions. They have reduced solvent use for gun cleaning and have dedicated color lines and pots at the finishing

operations. Saloom has developed an internal operator training manual for finishers which has resulted in less rework and less material (coating and cleanup solvent) usage.

Saloom wants to develop a hybrid waterborne coating system utilizing a waterborne topcoat. They hope to start using waterborne stain(s) and sealer(s) eventually, but are concerned about the grain raise issue with current products on the market. These changes could reduce the VOC emissions another 20 percent.

Saloom anticipates being able to double their current production without doubling their VOC emissions. They believe that the coating suppliers will make improvements in their coatings before Saloom gets close to the new (proposed) limit of 49 tons of VOCs per year and they will find a waterborne finishing system that meets their needs.